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Natural Fibre Composite Structural Sections for Residential Stud Wall Applications

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Abstract : Increasing awareness of environmental concerns is leading a drive towards more sustainable structural products for the built environment. Natural fibres such as flax, jute and hemp have recently been considered for fibre-resin composites, with a major motivation for their implementation being their notable sustainability attributes. While recent decades have seen substantial interest in the use of such natural fibres in composite materials, much of this research has focused on the materials aspects, including fibre processing techniques, composite fabrication methodologies, matrix materials and their effects on the mechanical properties. The present study experimentally investigates the compression strength of structural channel sections of flax, jute and hemp, with a particular focus on their suitability for residential stud wall applications. The section geometry is optimised for maximum strength via the introduction of complex stiffeners in the webs and flanges. Experimental results on both natural fibre composite channel sections and typical steel and timber residential wall studs are compared. The geometrically optimised natural fibre composite channels are shown to have compression capacities suitable for residential wall stud applications, identifying them as a potentially viable alternative to traditional building materials in such application, and potentially other light structural applications.

Keywords : channel sections, natural fibre composites, residential stud walls, structural composites
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